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ASSIGNMENT BOOKLET

SCN2242 Chemistry 20

Module 7 Assignment

FOR STUDENT USE ONLY

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Chemistry 20

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Module 7 **CHEMICAL ANALYSIS** *ASSIGNMENT BOOKLET*

FOR TEACHER'S USE ONLY

Summary

	Total Possible Marks	Your Mark
Lesson 1 Assignment		
Lesson 2 Assignment		
Lesson 3 Assignment		

Teacher's Comments

Chemistry 20
Module 7: Chemical Analysis
Assignment Booklet
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Students	✓
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MODULE 7: LESSON 1 ASSIGNMENT

Lesson 1 Assignment: Limiting Reagents

Lab: Chemical Analysis Using a Graph

Read "Lab Exercise 8.A: Chemical Analysis Using a Graph" on page 317 in your textbook. You may also find the information about this reaction on page 318 useful in completing your analysis. After you have read the lab, answer the following questions to complete your analysis.

Analysis

1. Write the balanced chemical equation for the reaction described in this lab exercise.
2. Identify the limiting reagent and the excess reagent in this lab.
3. What is observed when the two reacting solutions are mixed? Describe a test that could be performed to ensure that the reactions performed were complete.
4. Use a spreadsheet to create a graph of the data shown in "Table 1." In this lab, the manipulated variable is the mass of $\text{Pb}(\text{NO}_3)_2$ reacting. Use your completed graph to answer questions 4.a. and 4.b.
 - a. A lab technician weighs out 2.5 g of $\text{Pb}(\text{NO}_3)_2(\text{s})$ and dissolves it in water. What mass of $\text{PbI}_2(\text{s})$ can be produced from this solution?

- b. Explain how the data shown on the graph could be used to identify the limiting reagent in the reaction being studied.

Assignment Questions

1. 25.0 mL of 0.150-mol/L KBr(aq) is mixed with excess Pb(NO₃)₂(aq).
- a. Write the balanced chemical equation for this reaction.
- b. Calculate the number of moles of the limiting reagent.
- c. Predict the number of moles of precipitate.
- d. Calculate the mass of precipitate.

2. 3.00 L of methane, $\text{CH}_4(\text{g})$, is combusted with 5.00 L of oxygen gas. Assume SATP conditions.
- Write the balanced chemical equation.
 - Determine the number of moles of each reactant.
 - Predict the limiting reagent and the excess reagent.
 - When the reaction is complete, the atmospheric conditions change. Calculate the volume of $\text{CO}_2(\text{g})$ produced if the atmospheric pressure is now 102.1 kPa and the temperature is 22.0°C .
3. A 12.0-g piece of copper reacts with 40.0 g of silver nitrate dissolved in solution. What mass of silver will be formed from this reaction?

4. A laboratory technician measures 1.60 g of $\text{CuCl}_2(\text{s})$ and prepares a solution. When the solution is complete, a 150-mg piece of $\text{Al}(\text{s})$ is placed into the solution and left to react. Calculate the mass of copper produced when the reaction is complete.

5. A 150-mL sample of a 0.600-mol/L calcium nitrate solution is mixed with 1.00 L of 0.500-mol/L $\text{NaOH}(\text{aq})$. Calculate the mass of precipitate produced in the reaction.

6. Approximately 9.10 g of lead(II) acetate is weighed out and placed in a 400-mL solution of 0.150-mol/L sodium hydroxide. Calculate the mass of precipitate produced in this reaction.

MODULE 7: LESSON 2 ASSIGNMENT

Lesson 2 Assignment: Titration Analysis

Lab: Titration of an Acid with a Base

1. Use the data collected from the virtual titration experiment you completed to calculate the concentration of the hydroiodic acid solution tested.
2. Record below your set of comments that you made to one of your classmates about the organization, clarity, and precision of the classmate's answers to question 1 above.

Lab: Determining the Quantity of Vitamin C in Fruit Juice

Analysis

1. Read the background information and procedure for this investigation. Compare and contrast this procedure with the titration you performed earlier.

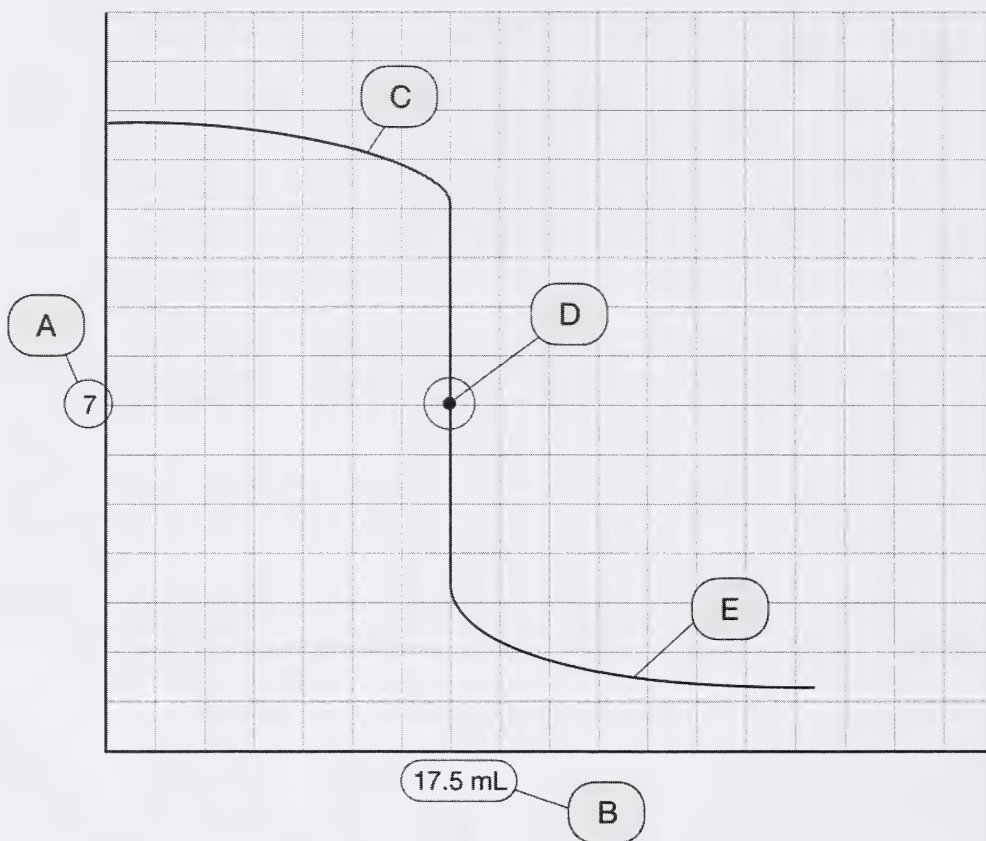
2. Use the data to calculate the average number of moles of ascorbic acid present in the titrated samples.
3. The volume of juice tested was 10.00 mL. What amount of ascorbic acid would be ingested if the entire juice box (200 mL) were consumed?
4. Calculate the mass of ascorbic acid in the juice box. Compare this value to the mass of vitamin C you expected in the juice (based on the information provided on the juice box).

MODULE 7: LESSON 3 ASSIGNMENT

Lesson 1 Assignment: Titration Curves and Selecting Indicators

1. Place a copy of the titration curve you have drawn here or on a separate piece of paper.

Use the following diagram to answer questions 2 and 3.

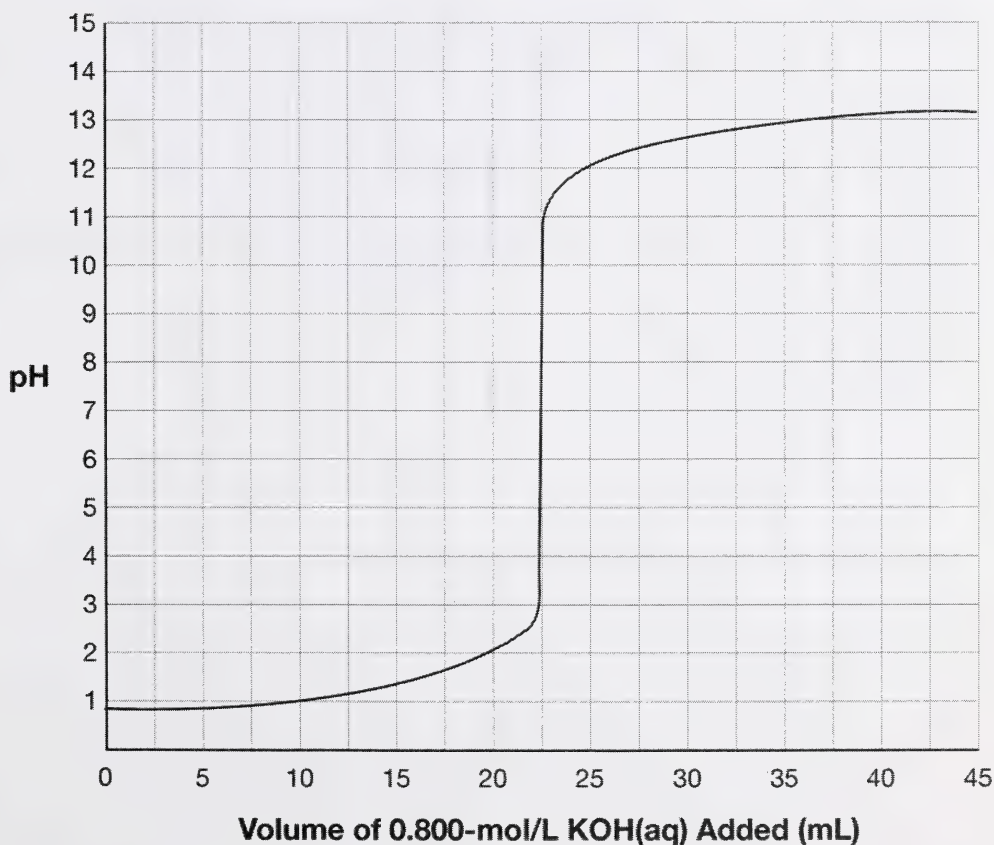


2. Explain the significance of each point or region in the following titration curve.

3. For the titration curve shown, suggest a possible titrant and test solution. Use features of the titration curve to justify your answer.

4. Use the following titration curve to answer questions 4.a. to 4.e:

**Titration Curve for Titrating 65.0 mL of Nitric Acid
with 0.800-mol/L Aqueous Potassium Hydroxide**



- a. Identify the volume of titrant used to reach the equivalence point for the titration.
- b. Identify the pH at the equivalence point for the titration.
- c. Identify a suitable indicator for the titration.
- d. Identify the colour change that signifies the endpoint for the titration using the indicator selected in question 3.c.
- e. Determine the concentration of the nitric acid solution analyzed in the titration.

Titration Analysis of ASA

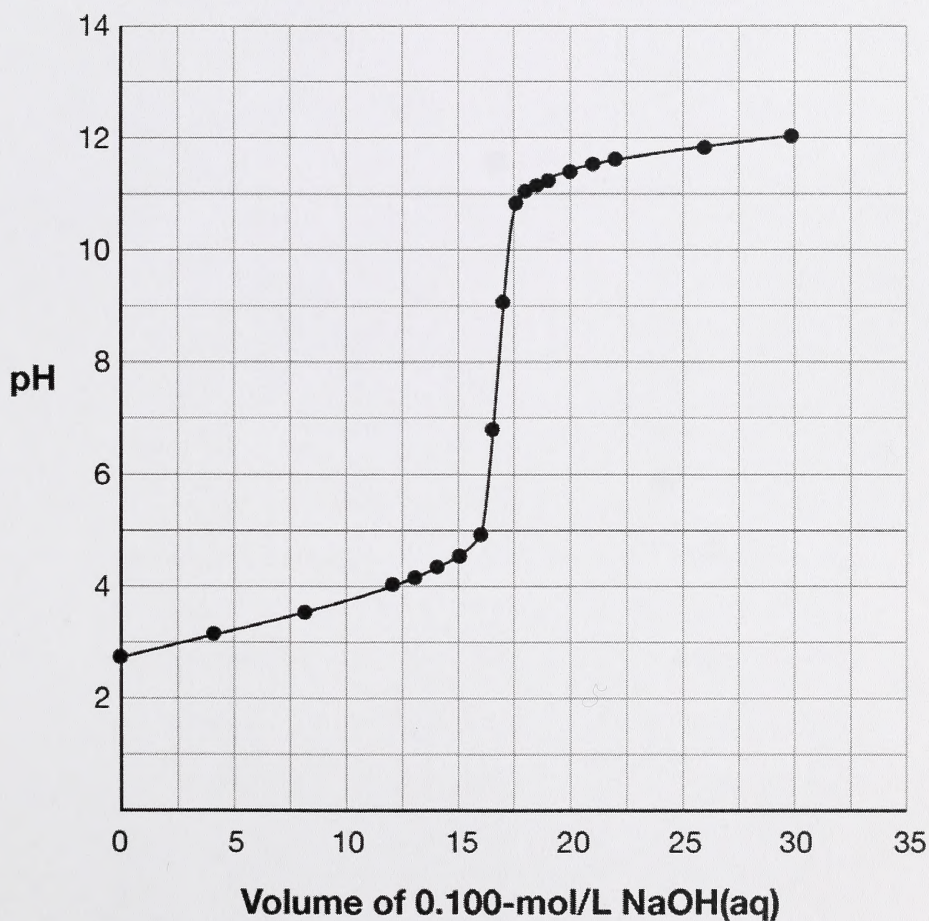
Purpose

You will analyze data from a titration experiment similar to that performed on page 345 of your textbook. The manufacturer of the pain reliever claims that each pill contains 325 mg of acetylsalicylic acid (ASA).

Read "Investigation 8.6: Titration Analysis of ASA" on page 345 of your textbook.

Materials

Titration of ASA with 0.100-mol/L NaOH(aq)



Observations**Titration of dissolved ASA with 0.100-mol/L NaOH(aq)**

Trial	1	2	3	4
Final Burette Reading (mL)	17.1	33.7	50.6	67.1
Initial Burette Reading (mL)	0.3	17.1	33.7	50.6
Volume of NaOH(aq) Added (mL)	16.8	16.6	16.9	16.5

Analysis

1. Use the titration curve for ASA to justify the selection of phenolphthalein as the indicator used in this experiment.
2. Use the data collected to calculate the average mass of ASA in the tablets tested.

Once you have completed all of the questions, submit your work to your teacher.

